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NASA TECH BRIEF

Marshall Space Flight Center

Impact Sensitivity of Materials in Contact With Liquid and Gaseous Oxygen at High Pressure

When many materials are subjected to impact, the local adiabatic compression results in a sudden high rise in the temperature of the material. If these materials are in contact with liquid or gaseous oxygen, the increase in temperature can be sufficient to cause ignition or explosive oxidation. A study has been made to determine the impact sensitivity of various polymer materials in contact with gaseous and liquid oxygen at high pressure. Results of the study are presented in a detailed report and include the effects on impact sensitivity as related to environmental pressure, sample thickness, and whether the sample was in contact with liquid or gaseous oxygen. Other studies have been conducted relating to the impact sensitivity of materials in contact with liquid and gaseous oxygen, but none appears to have considered in detail the effect of high pressure.

Tests run at high pressure using a new tester have indicated that the materials used in these specific tests showed an inverse relationship between thickness and impact sensitivity. Several materials tested exhibited greater impact sensitivity in gaseous oxygen than in liquid oxygen. The impact sensitivity of the materials tested in gaseous oxygen, at the test pressures, showed enchanced impact sensitivity with higher pressure.

Notes:

1. Information concerning this innovation may be of interest to cryogenic researchers and equipment manufacturers and, also, to the manufacturers of equipment or systems which utilize oxygen under high pressure.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Marshall Space Flight Center
   Code A&TS-TU
   Huntsville, Alabama 35812
   Reference: B72-10476

Patent status:

No patent action is contemplated by NASA.

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Category 06